

CLAIMS

We claim:

1. A method of performing network packet filtering, said method comprising:  
preprocessing a set of rules to generate a set of rule ranges along N dimensions;  
searching said rule ranges along said N dimensions in parallel to generate N sets of possible rules along said N dimensions;  
logically combining said N sets of possible rules to generate a final set of possible rules; and  
applying said final set of possible rules.

2. The method as claimed in claim 1 further comprising:  
generating a rule bit vector for each rule range along each of said N dimensions;

3. The method as claimed in claim 1 further comprising:  
generating a search structure for each set of rule ranges along each of said N dimensions;

4. The method as claimed in claim 3 wherein one of said search structures comprises a look-up table.

1                    5.     The method as claimed in claim 3 wherein one of said search  
2     structures comprises a tree search structure.

3     6.     The method as claimed in claim 1 wherein applying said final set  
4     of possible rules comprises selecting a highest priority rule in said final set of possible  
5     rules.

6     7.     The method as claimed in claim 1 wherein applying said final set  
7     of possible rules comprises applying all rules in said final set of possible rules.

8     8.     The method as claimed in claim 1 wherein each of said N sets of  
9     possible rules comprise a rule bit vector that specifies a set of rules that may apply.

10     9.     The method as claimed in claim 8 wherein said rule bit vectors are  
11     logically ANDed together to produce a final bit vector of rules that apply.

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10. The method as claimed in claim 9 wherein applying said final set of possible rules comprises selecting a highest priority rule in said final set of possible rules.

1 11. A method of pre-processing a set of rules for processing incoming  
2 data units, said incoming data units having a set of N dimensions to examine, said method  
3 comprising:

4 dividing each of said N dimensions into a contiguous set of rule ranges;  
5 assigning each of said rule ranges a range identifier; and  
6 creating a search structure for each of said N dimensions that organizes said rule  
7 ranges along each dimension such that an incoming data unit may be quickly  
8 classified into one of said rule ranges.



1 12. The method as claimed in claim 11 wherein said range identifier  
2 comprises a rule bit vector that specifies a set of rules that may apply to incoming data  
3 units that fall within the associated rule range.

1 13. The method as claimed in claim 12 wherein said rule bit vectors  
2 are logically ANDed together by a rule processor to produce a final bit vector of rules that  
3 apply.

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1                    14.    The method as claimed in claim 13 wherein said rule processor  
2    selects a highest priority rule in said final set of possible rules.

1                    15.    The method as claimed in claim 11 wherein said range identifier  
2    comprises an index value.

1                    16.    The method as claimed in claim 15 wherein said index values are  
2    used by a rule processor to index into a N dimensional look-up table for a final rule.



1                    17.    The method as claimed in claim 11 wherein one of said search  
2    structures comprises a look-up table.

1                    18.    The method as claimed in claim 11 wherein one of said search  
2    structures comprises a tree search structure.

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1            19.    A method of processing incoming data units, said incoming data  
2 units having a set of N dimensions to examine, said method comprising:  
3            searching N search structures for said N dimensions in parallel to classify  
4            incoming data units into a matching rule range along each of said N  
5            dimensions;  
6            logically combining said N matching rule ranges to generate a final set of possible  
7            rules; and  
8            applying said final set of possible rules.

1            20.    The method as claimed in claim 19 wherein each rule range  
2 comprises a range identifier.



1            21.    The method as claimed in claim 20 wherein said range identifier  
2 comprises a rule bit vector that specifies a set of rules that may apply to incoming data  
3 units that fall within the associated rule range.

1            22.    The method as claimed in claim 21 wherein said step of logically  
2 combining said N matching rule ranges comprises logically ANDing together said rule bit  
3 vectors to produce a final set of possible rules.

1                   23.    The method as claimed in claim 22 wherein said applying said  
2   final set of possible rules comprises selecting a highest priority rule in said final set of  
3   possible rules.

1                   24.    The method as claimed in claim 20 wherein said range identifier  
2   comprises an index value.

1                   25.    The method as claimed in claim 20 wherein said index values are  
2   used to index into a N dimensional look-up table for a final rule.

1                   26.    The method as claimed in claim 19 wherein one of said N search  
2   structures comprises a look-up table.

1                   27.    The method as claimed in claim 19 wherein one of said search  
2   structures comprises a tree search structure.

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